CLAIMS

What is claimed is:

1. A method of compressing a video or image, comprising the steps of:

defining a configuration space that models an optimal bit allocation problem of a data compression process, the configuration space defining nodes and transitions between the nodes, the nodes corresponding to the selection of respective quantizers for respective features of a data stream, a path defined by a set of transitions each connected at respective ones of said nodes to another one of said set, said path joining a start node and an end node and having a total cost corresponding to a sum of costs of said transitions of said set;

propagating least-cost waves through said configuration space by budding, responsively to a space-variant metric, such that a first path of lowest found cost is identified through said configuration space joining said start node and said end node; and

applying the quantizers corresponding to said nodes lying on said first path to a first set of data to be compressed by said data compression process.

2. A method as in claim 1, further comprising the step of repeating said step of propagating such that a second path of lowest found cost is identified and repeating said step of applying in compressing a second set of data to be compressed by said data compression process.

3. A method of compressing a video or image, comprising the steps of:

defining a configuration space that models an optimal bit allocation problem of a data compression process, the configuration space defining nodes and transitions between the nodes, the nodes corresponding to the selection of respective quantizers for respective features of a data stream, a path defined by a set of transitions each connected at respective ones of said nodes to another one of said set, said path joining a start node and an end node and having a total cost corresponding to a sum of costs of said transitions of said set;

propagating least-cost waves through said configuration space by budding, responsively to a space-variant metric, such that a first path of lowest found cost is identified through said configuration space joining said start node and said end node;

repeating said step of propagating such that a second path of lowest found cost is identified; and

comparing said costs of said first and second paths and applying the quantizers corresponding to said nodes lying on a lower cost one of said first and second paths in compressing input data to be compressed by said data compression process.

4. A method as in claim 3, wherein said steps of repeating and comparing are performed conditionally based upon an allowed time interval for finding an optimal least cost path.

5. A method as in claim 3, wherein said input video data includes video data and said cost is one of a distortion of images of said video data and a bit rate of a data stream resulting from said step of applying.

6. A data compression device, comprising:

a processor connected to receive a raw data stream and output a compressed data stream;

said processor being programmed to determine optimal quantizers by budding nodes of a configuration space that models an optimal bit allocation problem of a data compression process, the nodes corresponding to the selection of respective quantizers for respective features

of a data stream, a path defined by a set of transitions each connected at respective ones of said nodes to another one of said set, said path joining a start node and an end node and having a total cost corresponding to a sum of costs of said transitions of said set;

said budding including propagating least-cost waves through said configuration space responsively to a space-variant metric such that a path of lowest found cost is identified through said configuration space joining said start node and said end node;

said processor being programmed to apply the quantizers corresponding to said nodes lying on said path of lowest cost in compressing said raw data.

7. A data compression device, comprising:

a processor connected to receive a raw data stream and output a compressed data stream;

said processor being programmed to determine optimal quantizers by budding nodes of a configuration space that models an optimal bit allocation problem of a data compression process, the nodes corresponding to the selection of respective quantizers for respective features of a data stream, a path defined by a set of transitions each connected at respective ones of said nodes to another

one of said set, said path joining a start node and an end node and having a total cost corresponding to a sum of costs of said transitions of said set;

said budding including propagating least-cost waves through said configuration space responsively to a space-variant metric such that a first path of lowest found cost is identified through said configuration space joining said start node and said end node;

said processor being programmed to further propagate further cost waves to identify a second path of lowest found cost and to compare said costs of said first and second paths and apply the quantizers corresponding to said nodes lying on a lower cost one of said first and second paths in compressing said raw data.

8. A method of allocating bits for optimal rate/distortion performance in digital data compression, comprising:

determining a set of interconnected choices of quantizers for each of a set of portions of a data stream in accord with said digital data compression;

defining a starting one of said choices and propagating least-cost waves beginning with said starting

one until a path defining all necessary quantizers is found; and

implementing a data compression based upon at least some of said quantizer choices defined by said path.

9. A method as in claim 8, wherein said step of determining includes determining a set of interconnected choices of quantizers for each of set of portions of a video data stream.

10. A method as in claim 9, wherein said quantizers include a quadtree decomposition of a video image.

11. A method as in claim 9, wherein said quantizers include a quantizer for representing a motion vector field.

12. A method as in claim 8, wherein said quantizers include a quantizer for quantizing differences between values in said data stream.

13. A device for allocating bits for optimal rate/distortion performance in digital data compression, comprising:

a processor linked to a data stream and programmed to determine a set of interconnected choices of

quantizers for each of a set of portions of a data stream in accord with said digital data compression;

said processor being further programmed to define a starting one of said choices and to propagate least-cost waves beginning with said starting one until a path defining all necessary quantizers is found; and

said processor being further programmed to implement a data compression process based upon at least some of said quantizer choices defined by said path.

14. A device as in claim 13, wherein said data stream is a video data stream.

15. A device as in claim 14, wherein said quantizers include a quadtree decomposition of a video image.

16. A device as in claim 14, wherein said quantizers include a quantizer for representing a motion vector field.

17. A device as in claim 13, wherein said quantizers include a quantizer for quantizing differences between values in said data stream.

18. A device for allocating bits for optimal rate/distortion performance in digital data compression, comprising:

a processor linked to a data stream and programmed to determine a set of interconnected choices of quantizers for each of a set of portions of a data stream in accord with said digital data compression;

said processor being further programmed to define a starting one of said choices and to propagate least-cost waves beginning with said starting one until a first path defining all necessary quantizers is found;

said processor being further programmed to propagate least-cost waves beginning with a lowest cost incomplete path until a second path defining all necessary quantizers is found;

said processor being further programmed to implement a data compression process based upon at least some of said quantizer choices defined by a lowest cost one of said first and second paths.

19. A device as in claim 18, wherein said data stream is a video data stream.

20. A device as in claim 19, wherein said quantizers include a quadtree decomposition of a video image.

21. A device as in claim 19, wherein said quantizers include a quantizer for representing a motion vector field.

22. A device as in claim 18, wherein said quantizers include a quantizer for quantizing differences between values in said data stream.